



AVEVAWORLD

APRIL 9, 2025

CONNECT data services for a data analytics platform at F. Hoffmann-La Roche

Bernd Sessler - Senior Automation Engineer, F. Hoffman-La Roche

Lukas Markwalder - Director, Capgemini Digital Manufacturing

Hans-Otto Weinhold - Principal Solutions Architect, AVEVA



CEO,
Thomas Schinecker

“

Roche focuses on innovation for people's health around the world. With Pharmaceuticals and Diagnostics under one roof, we are uniquely positioned to improve care along the patient journey.

”

Roche at a glance

Who we are and what we do



128 years
founded in Basel in 1896



**A leader in healthcare
R&D**
with CHF 13 billion invested
in 2024



**3 Nobel prizes and
44 Prix Galien**
since 1974



CHF 60.5 billion*
in Roche Group sales in 2024



**44 Roche medicines &
90 diagnostics****
on the WHO List of
Essential Medicines & Tests



>100,000
dedicated employees
worldwide



>23 million people
treated with our medicines
in 2024



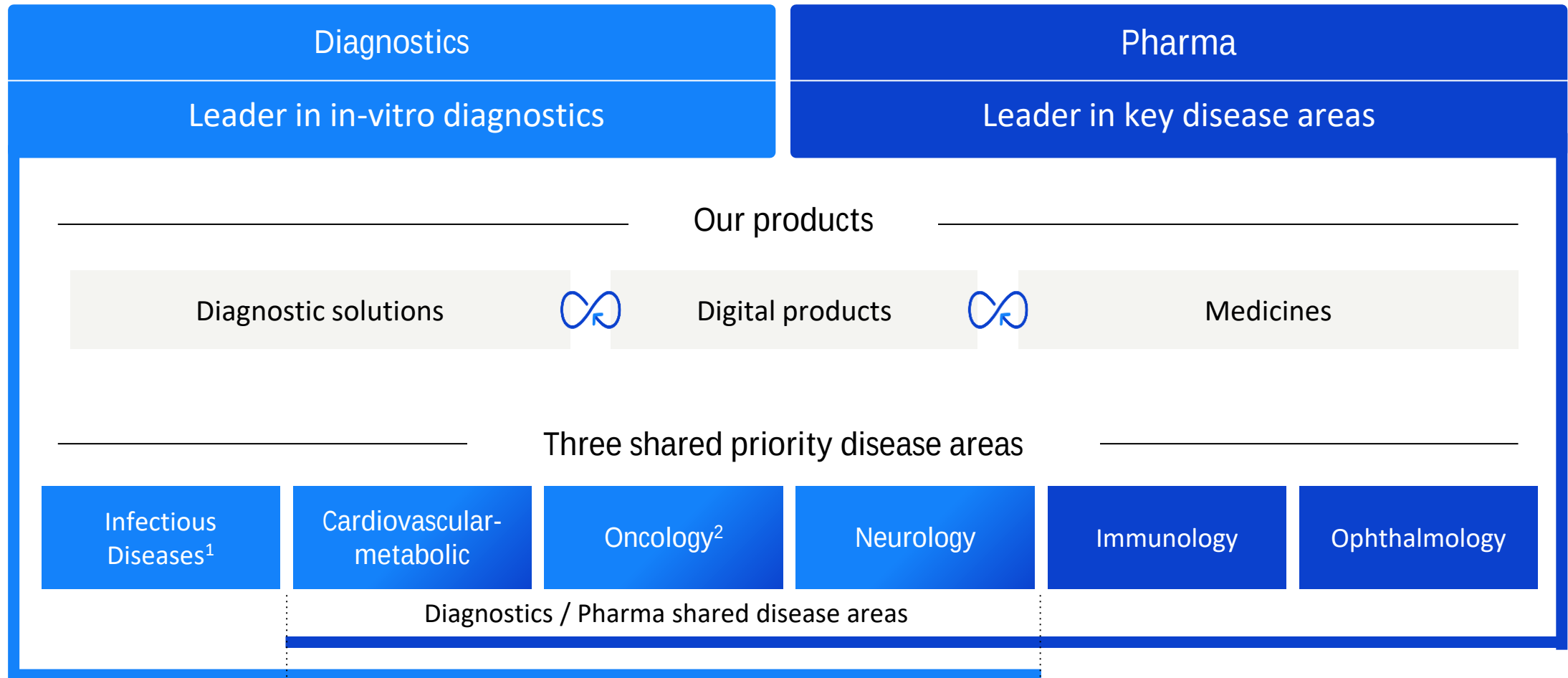
30 billion tests
conducted with our
Diagnostics products in 2024

*Unless otherwise stated, all growth rates and comparisons to the previous year are at constant exchange rates (CER; average rates 2023) and all total figures quoted are reported in CHF.

** Medicines and tests that have either been developed or acquired by Roche

Two divisions working together to address healthcare needs

Three shared priority disease areas between Diagnostics and Pharma



¹ Also relevant for Antimicrobial Resistance in Pharma; ² Includes Hematology in Pharma

F. Hoffmann-La Roche requires a reliable cloud-based data platform

Pharma & Life Sciences | Switzerland - Global



Challenges

- Availability of relevant data for business analysts of ROCHE
- Terabytes in the PI System become petabytes in a commercial datalake
- Complex server landscape to aggregate data at global scale
- High skill set and expertise required to work with data
- Demonstration of project results in less than 3 months (target milestone: Hannover Messe)

Solution

- Leverage CONNECT Data Services (aka AVEVA Data Hub) as industrial data enablement infrastructure
- Leverage AVEVA Advanced Analytics for rapid implementation of self-service data analytics
- Partnership approach: Client – Vendor – Integrators

Results

- End-to-End data availability
- Major reduction of data consumption cost (petabytes become terabytes again 😊)
- Potential reduction by approx. up to 70 servers within the entire system landscape
- accelerated time-to-market for industrial data-products

“

We didn't expect to have tangible results within such a short time frame. CONNECT data services supported by a strong partner (Capgemini) accelerates the time-to-value of a cloud-based data infrastructure significantly.

Heiko Trefzger, ROCHE, Product Manager – Data & Insights

”

Business success objectives



Collaborative efficiency

Sharing contextualized data product for further analysis or optimization can eliminate redundant efforts and promote collaborative efficiency resulting in substantial savings. This includes data engineering and data platform cost.



Scalability

Adopting this data-driven approach prepares the manufacturing setup for future expansions and innovations. The goal is to achieve a reduction in integration costs for other production sites.



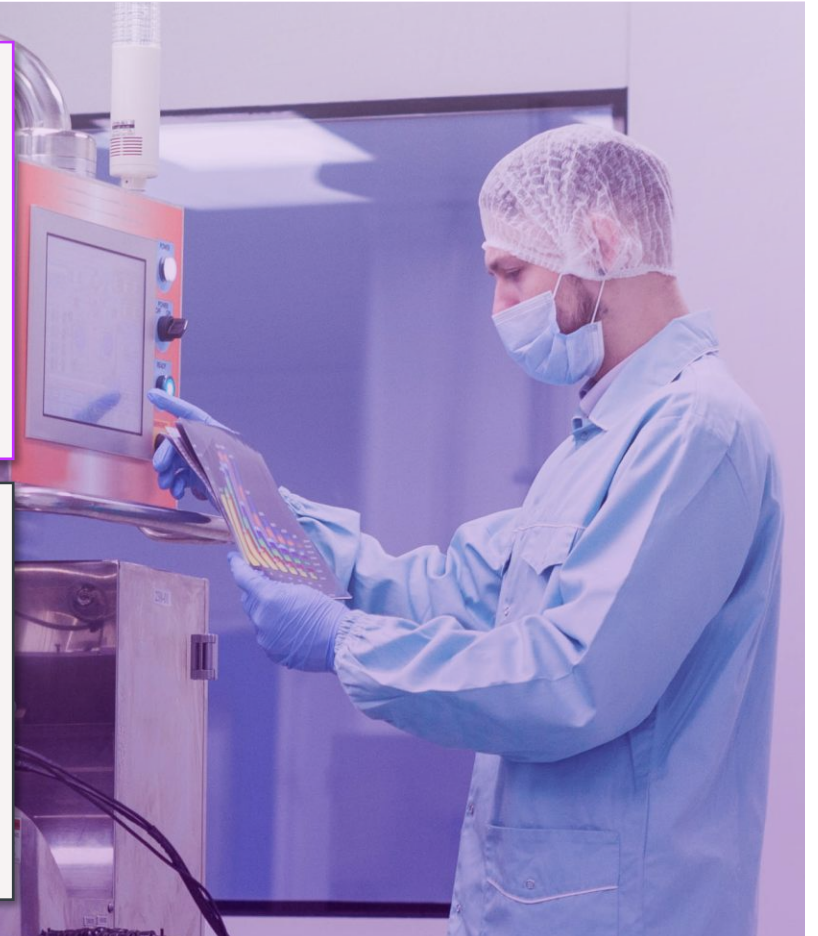
Validation

ROCHE will evaluate how CONNECT data services can be embedded into their FDA-validated data infrastructure and provide validation requirements to be fulfilled by AVEVA as well as feedback on those requirements.



Architecture

Create a blueprint architecture to consolidate and harmonize the overall data architecture.



Use cases during the Lighthouse project

Use Case 1 - Data Mesh – Collaboration enablement

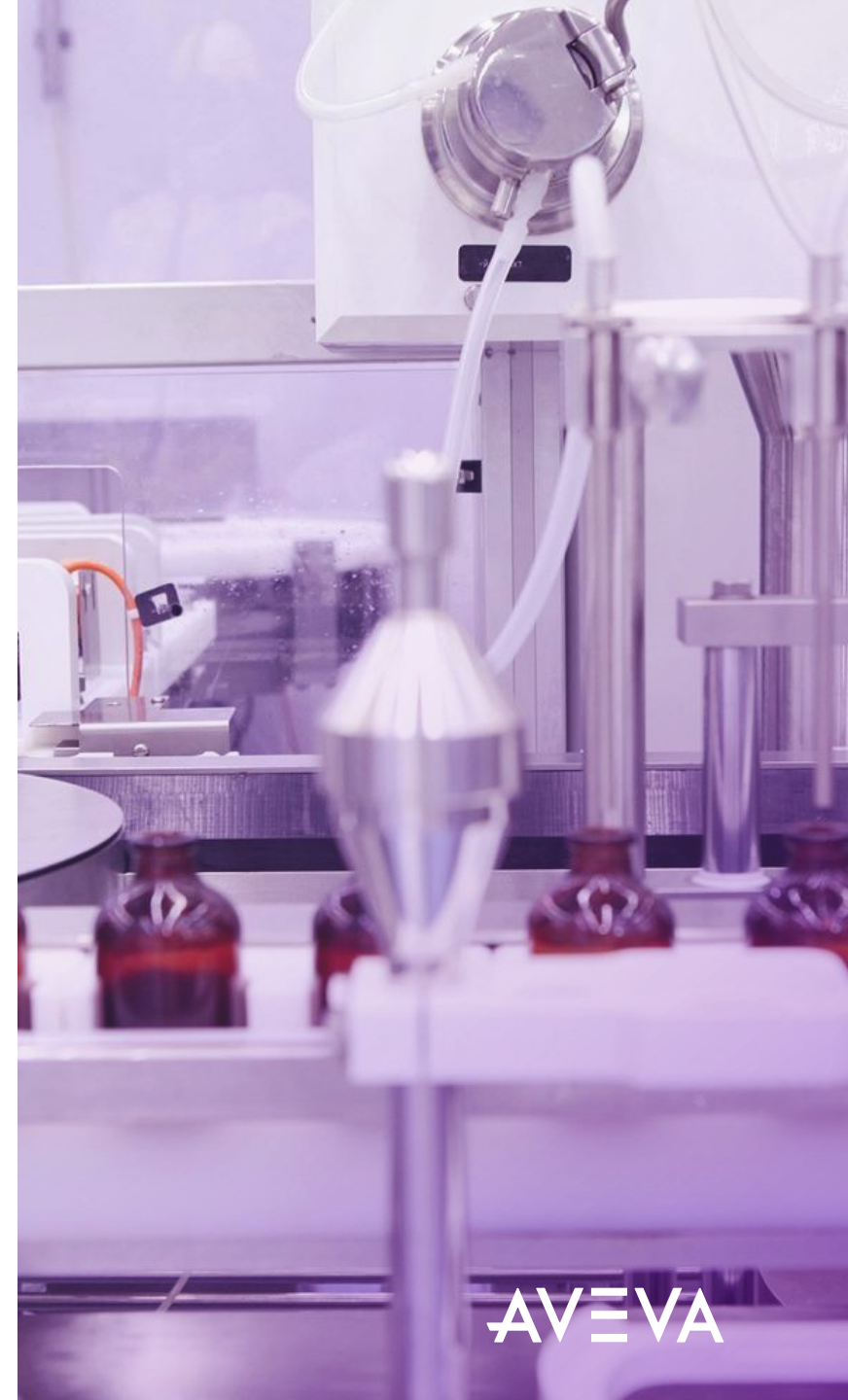
1. Centralizing manufacturing data from different distributed PI Systems in a global cloud-hosted repository
2. Sharing data from Operations to various tools and applications for data analytics and reporting
 - Snowflake (Enterprise Data Hub)
 - Data analytics (Dataiku, Seeq, AVEVA Advanced Analytics)

Use Case 2 - Digital maintenance using AVEVA Advanced Analytics

- Centrifuge condition monitoring

Optional use cases

- Net-Production-Time KPIs
- Energy Monitoring



AVEVA

Success criteria



Rapid Data
Integration from
On-Premise to
Cloud



Establish Data Mesh
– integrate with
existing applications



Digital Maintenance –
Experience Self-Service
Data Analytics as an
after-work experience

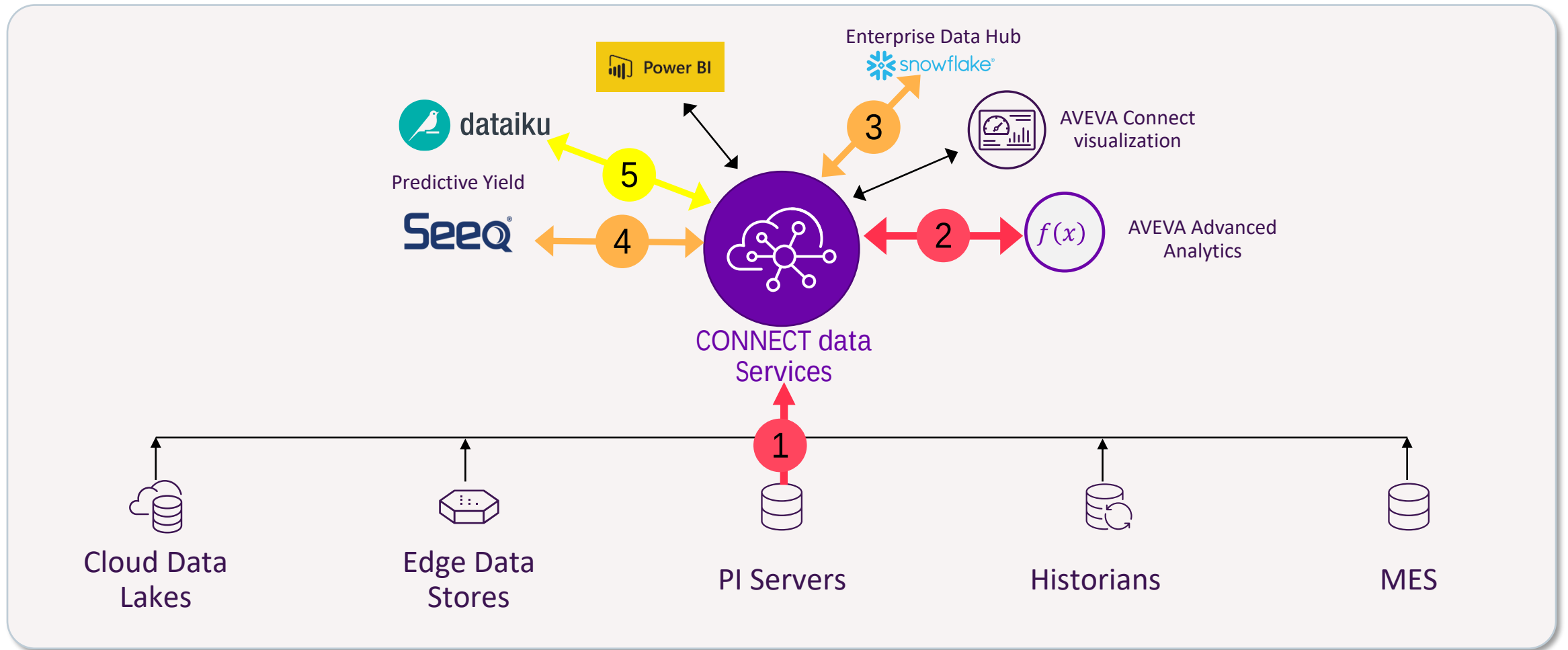


Improve availability of
manufacturing data
and its
ease-of-use



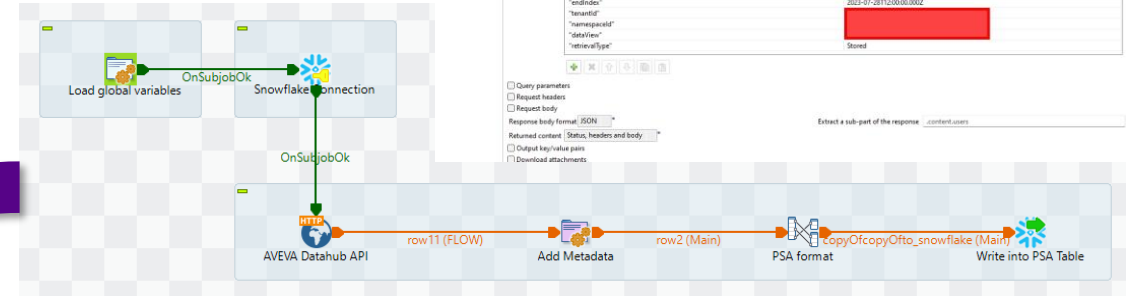
Achieve rapid
deployment and
scale-up to
production

Use case 1 – Data mesh



Integration with snowflake®

- Snowflake being used as central IT Data Warehouse at ROCHE
- Data Analytics tools using Snowflake as common data source
- Combination of OT and IT data
- ROCHE's original approach:
 - PI SQL Client ⇒ Talend Data Pipeline ⇒ Snowflake
- Lighthouse approach:
 - PI ⇒ CONNECT data views ⇒ Talend Data Pipeline ⇒ Snowflake
- Future:
 - PI ⇒ CONNECT ⇒ Snowflake virtual table – no more data replication



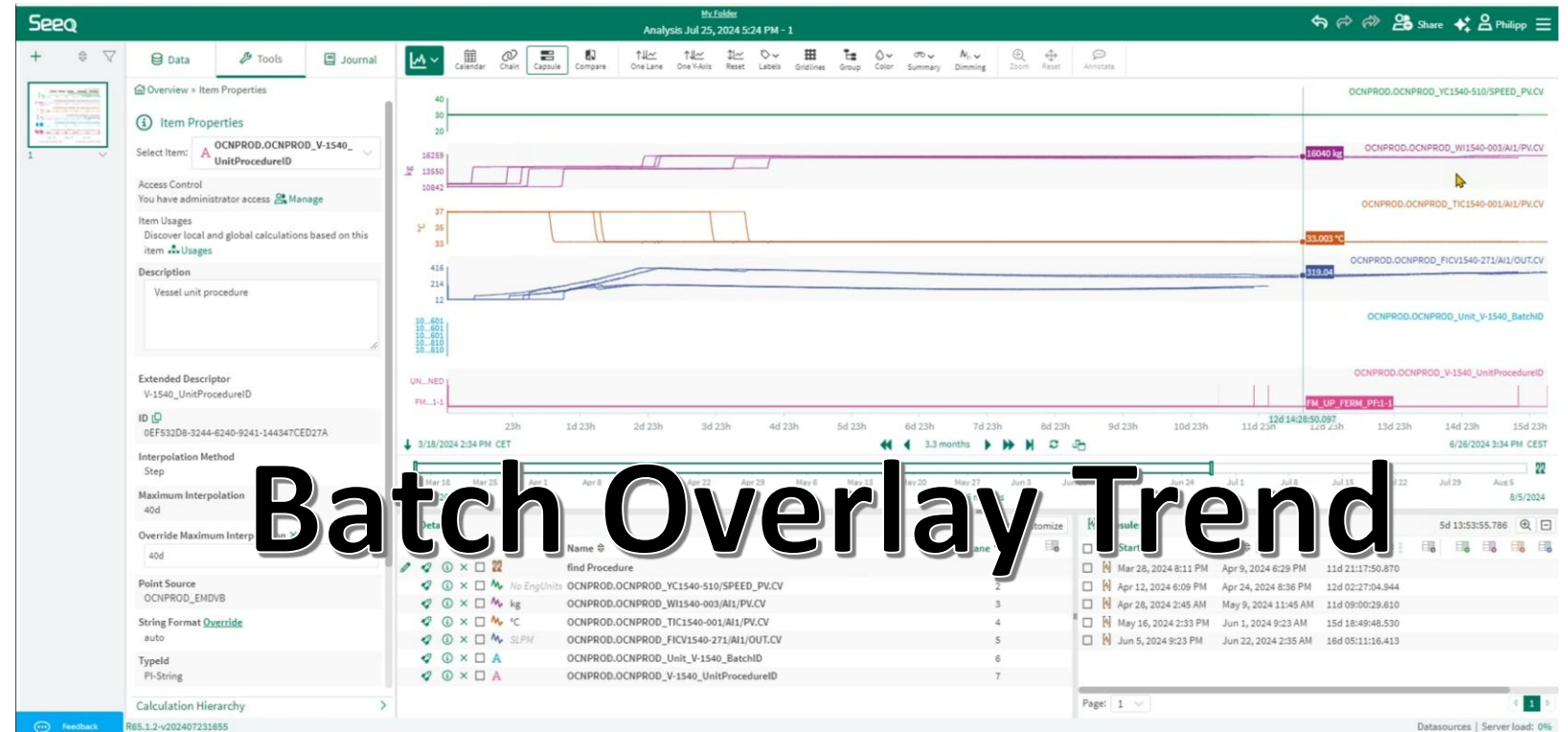
	SYS_LOADED_ID	SYS_DATASOURCE	SYS_SOURCE_ENV	SYS_LOADED_FORMAT	SYS_LOADED_BY	BATCH_ID	JSON_STRING	MZNR
1	20240625130144	Dev	json	Talend	85xxx	("Agitation_Value_spm": 0, "Name": "M2211 - Vorfermenter (80L)", "Plant_Na...	M2xxx	
2	20240625130144	Dev	json	Talend	85xxx	("Controlling_pH_probe_Value": 7.2270265, "Name": "M2211 - Vorfermenter...	M2xxx	
3	20240625130144	Dev	json	Talend	85xxx	("CO2_Flow_Value": 0.0003689136, "Name": "M2211 - Vorfermenter (80L)",...	M2xxx	
4	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
5	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
6	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
7	20240625130144	Dev	json	Talend	85xxx	("Base_Balance_Value_jug": 4.25, "Name": "M2211 - Vorfermenter (80L)", "Pl...	M2xxx	
8	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
9	20240625130144	Dev	json	Talend	85xxx	("Backpressure_Value": 10.84137, "Name": "M2211 - Vorfermenter (80L)",...	M2xxx	
10	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "CO2_Flow_Value": 0.00054291996...	M2xxx	
11	20240625130144	Dev	json	Talend	85xxx	("N2_Flow_Value": 0.000758928, "Name": "M2211 - Vorfermenter (80L)", "Pl...	M2xxx	
12	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Optical_Density_OD_Value": 0.111...	M2xxx	
13	20240625130144	Dev	json	Talend	85xxx	("Agitation_Value_spm": 0, "Name": "M2211 - Vorfermenter (80L)", "Plant_Na...	M2xxx	
14	20240625130144	Dev	json	Talend	85xxx	("Controlling_pH_probe_Value": 7.2285457, "Name": "M2211 - Vorfermenter...	M2xxx	
15	20240625130144	Dev	json	Talend	85xxx	("CO2_Flow_Value": 0.0003689136, "Name": "M2211 - Vorfermenter (80L)",...	M2xxx	
16	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
17	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
18	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
19	20240625130144	Dev	json	Talend	85xxx	("Base_Balance_Value_jug": 4.25, "Name": "M2211 - Vorfermenter (80L)", "Pl...	M2xxx	
20	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Plant_Name": "Basel Biotech Produ...	M2xxx	
21	20240625130144	Dev	json	Talend	85xxx	("Backpressure_Value": 10.84137, "Name": "M2211 - Vorfermenter (80L)",...	M2xxx	
22	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "CO2_Flow_Value": 0.00054291996...	M2xxx	
23	20240625130144	Dev	json	Talend	85xxx	("N2_Flow_Value": 0.000758928, "Name": "M2211 - Vorfermenter (80L)", "Pl...	M2xxx	
24	20240625130144	Dev	json	Talend	85xxx	("Name": "M2211 - Vorfermenter (80L)", "Optical_Density_OD_Value": 0.111...	M2xxx	

```
[ ] JSON_STRING
{
  "Controlling_pH_probe_Value": 7.2270265,
  "Name": "M2211 - Vorfermenter (80L)",
  "Plant_Name": "Basel Biotech Production",
  "SAP_Plant_Code": "M2211",
  "Timestamp": "2023-06-08T22:02:24.1920013Z"
}
```

Integration with Seeq®

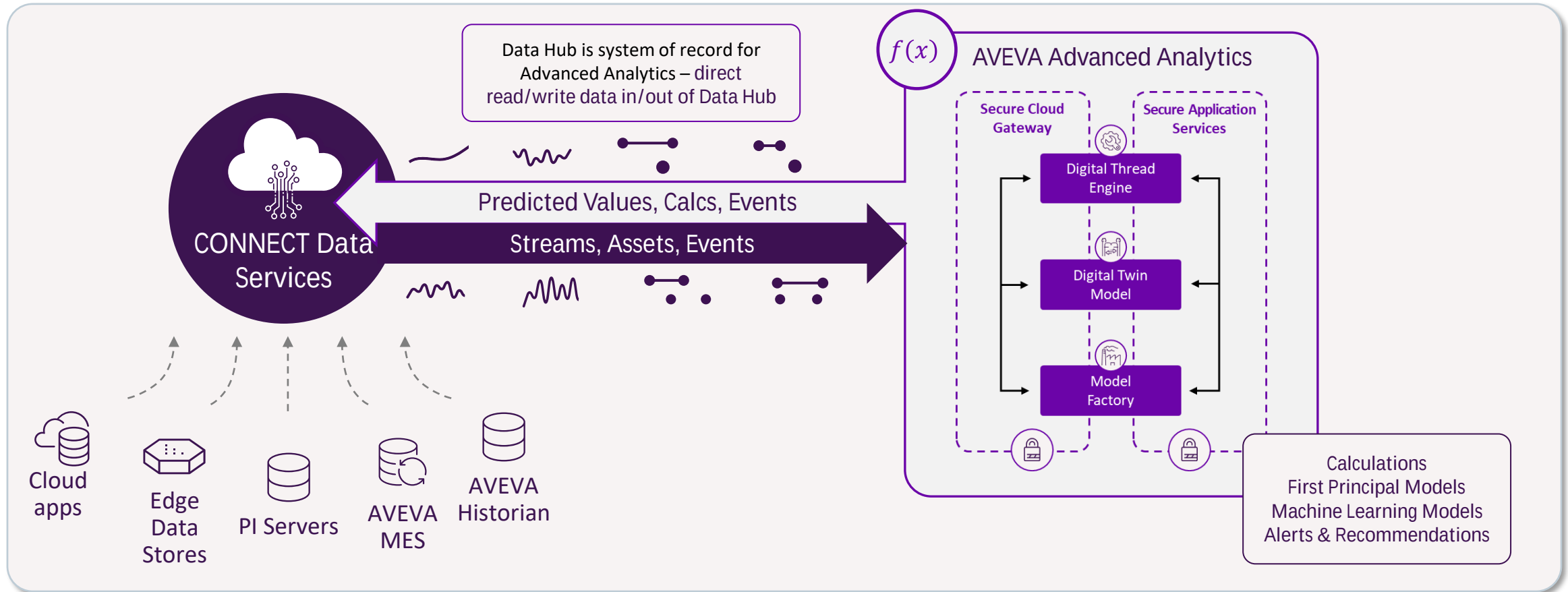
Bioreactor V-1540 Production Analysis

- Seeq is used at ROCHE to analyze data from PI System
- Upgrade to Seeq SaaS provides native CONNECT integration
- Visualization and data Analytics through cloud-native connection



Use case 2 - Digital maintenance

From calendar-based maintenance to predictive as an afterwork experience



Use case 2a – Condition-based centrifuge maintenance

Physical equipment:

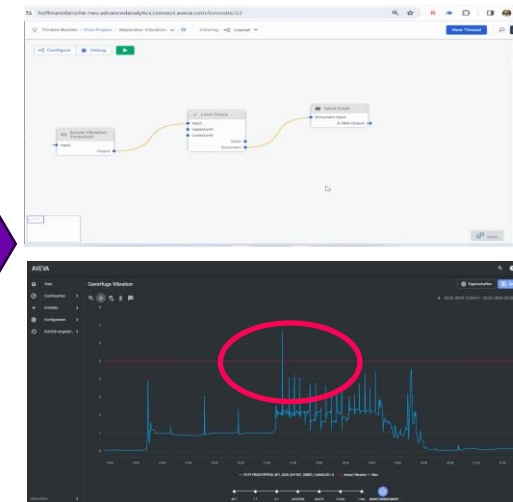
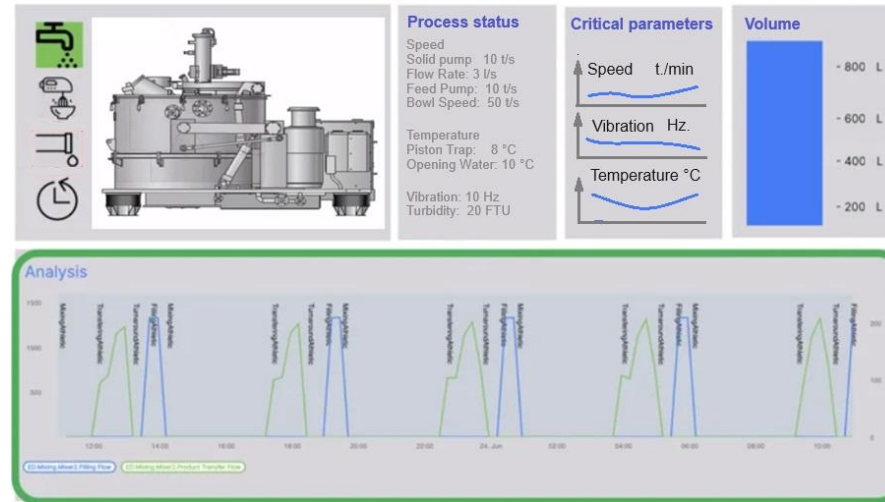
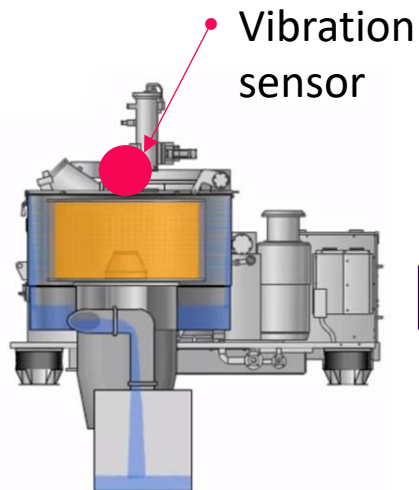
- Centrifuge CN-1610 after harvest in BioPharma Process

Problem statement:

- Condition-based maintenance shall replace calendar based punctual inspections
- Increase efficiency to detect and alert deteriorations before a breakdown that generates damage, delay and high cost

Advanced Analytics:

- Rapid development of model
- Monitor threshold on vibrations to trigger actions



Use Case 2b – Centrifuge process monitoring

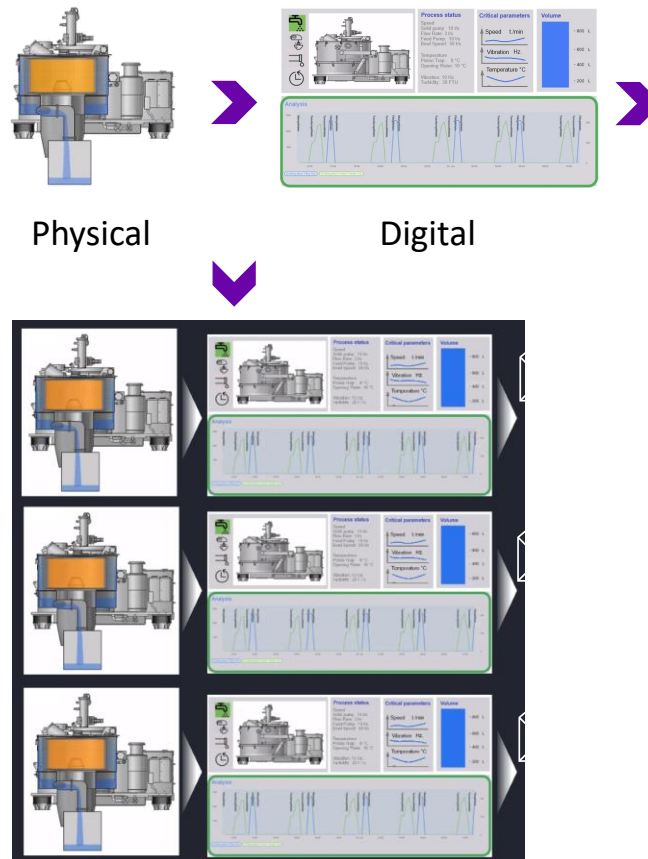
Anomaly detection in centrifuge data

Anomaly detection with AVEVA Advanced Analytics

- Twin for digital representation of asset
- Anomaly detection model out of the box
- Multi variable observation
- Self-learning with history
- Notification

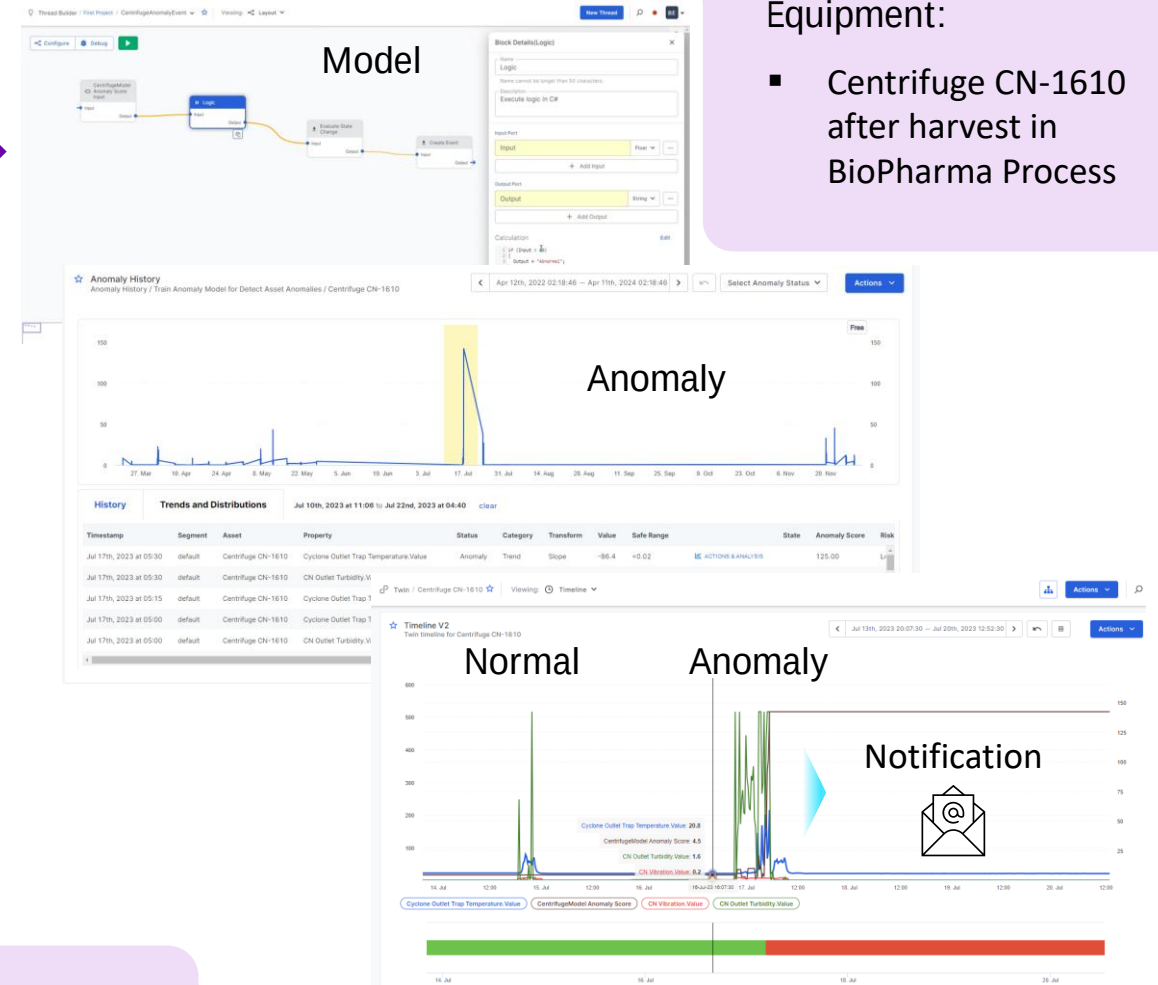
Benefits AVEVA

- Access to all tags from Connect Data Services
- No-code model out-of-the-box
- Days not weeks to solution



Scaling to fleet:

Create model once, train, tune, replicate easily



Equipment:

- Centrifuge CN-1610 after harvest in BioPharma Process

Use Case 3 - Net Production Time of a Bioreactor

Using the Thread Engine to create production events in CONNECT

Equipment:

- Bioreactor V-1540 BioPharma Process

Net Production Time with AVEVA Advanced Analytics

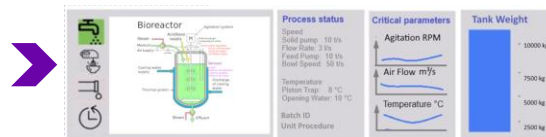
- Twin for digital representation of asset
- Easy configuration of threads (Node-Red Style)
- Multi variable observation
- Backfilling of Production Events
- Notification on Event
- Using the NPT as potential input to a Predictive Uptime Model

Benefits AVEVA

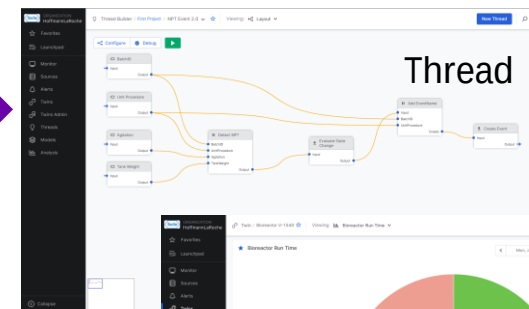
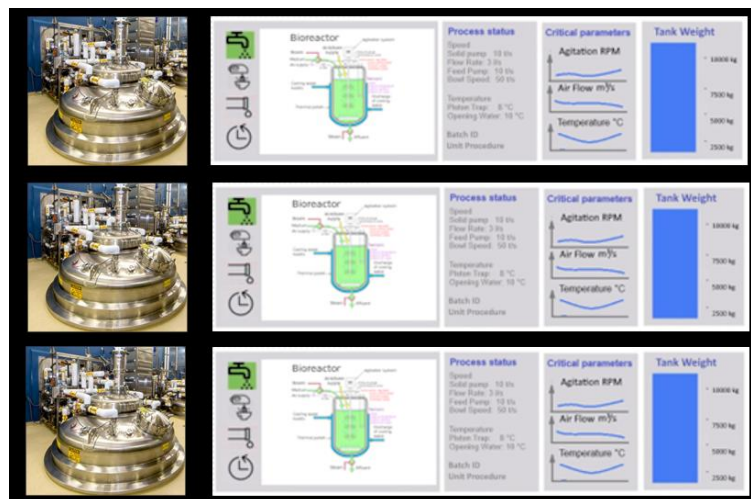
- Access to all tags from CONNECT data services
- Use Event Data Store
- Visualization of NPT Score using CONNECT visualization Services
- No-code model out-of-the-box



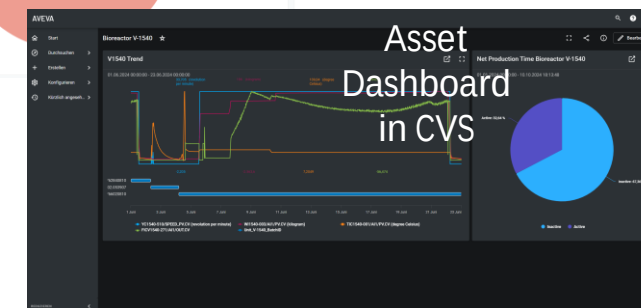
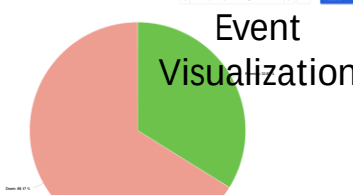
Physical



Digital



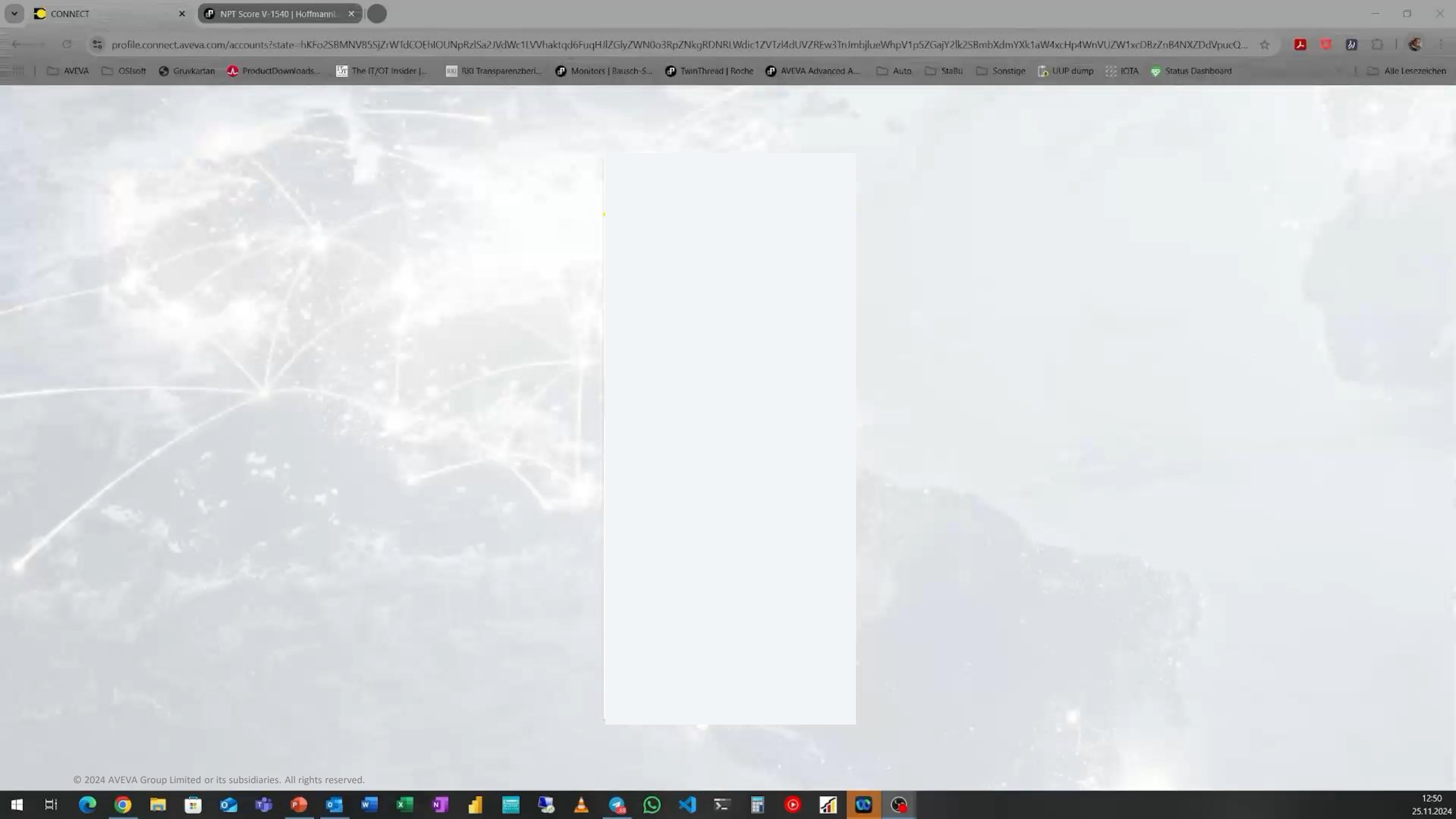
Notification



Scaling to fleet:

Create Thread once, train, tune, replicate easily

Live Demo –
AVEVA Advanced Analytics – Thread for NPT Event Detection
CONNECT Data Services – NPT Events
CONNECT Visualization Services – Event Dashboard
SEEQ Workbench with Batch Data of Bioreactor V-1540



Administration - Seeq

1 - AVEVA Connect Data - Seeq

roche-dev.seeq.tech/administration

Apps

Bookmarks

Office 365

GR&TA

PSM

Seeq

BS

KAU

OSIssoft

Roche Tools

Ext. Services

BAS/KAU IoT

Projects

All Bookmarks

Seeq

Philipp

Administration

Server admin contact: Philipp Sutter

Datasources

Agents

Users

Groups

Schedules

Usage

Requests

Subscriptions

Jobs

Configuration

Exports

Access Keys

Warning: 2 agents are disconnected. Manage or view agent information.

Datasources: 15 / 16

+ Add Datasource

Datasource Class

Datasource Name

Datasource Id

Agent

Connection Status

Metrics Time Range

Datasource Labels

AVEVA Data Hub

Filter by...

Filter by...

Filter by...

select

3 days

X

Add label

AVEVA Data Hub: AVEVA Lighthouse

Currently Indexed

Previous Index

21. Nov. 2024 16:29

14. Nov. 2024 16:30

21007 signals

21007 signals

Indexing Status: Success

Next Scheduled Index: 28. Nov. 2024 16:23

Estimated Indexing Time: 00:06:49

+ Request Index

Access Control

Datasource Metrics (Last 3 days)

Failed Requests: 0

Successful Requests: 66

Samples Returned: 12K

Allow Requests to Datasource

Cache Enabled

Datasource Enabled

Cancel all Requests

Manage

Connection served by JVM Agent: seeq-server-0

View Logs

Configure

Connector developed by Seeq

Feedback

R66.0.0-v202410142238-SNAPSHOT

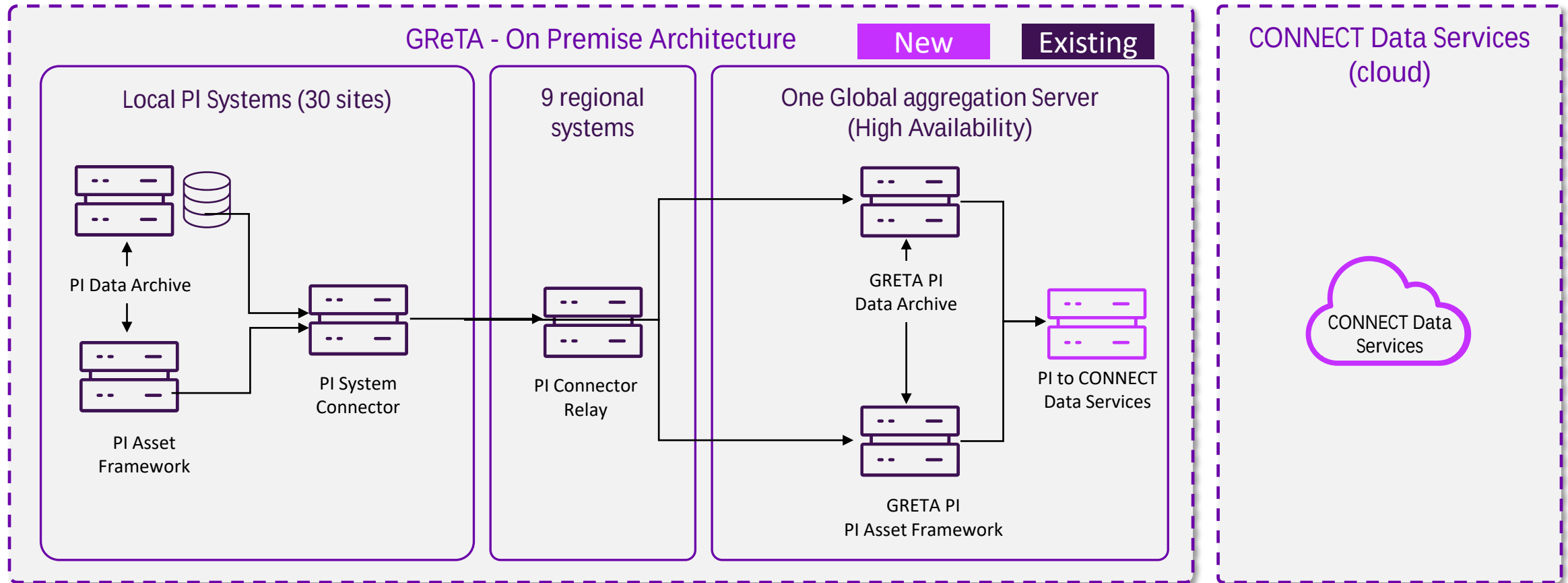
Datasources | Server load: 0%

10:48

22.11.2024

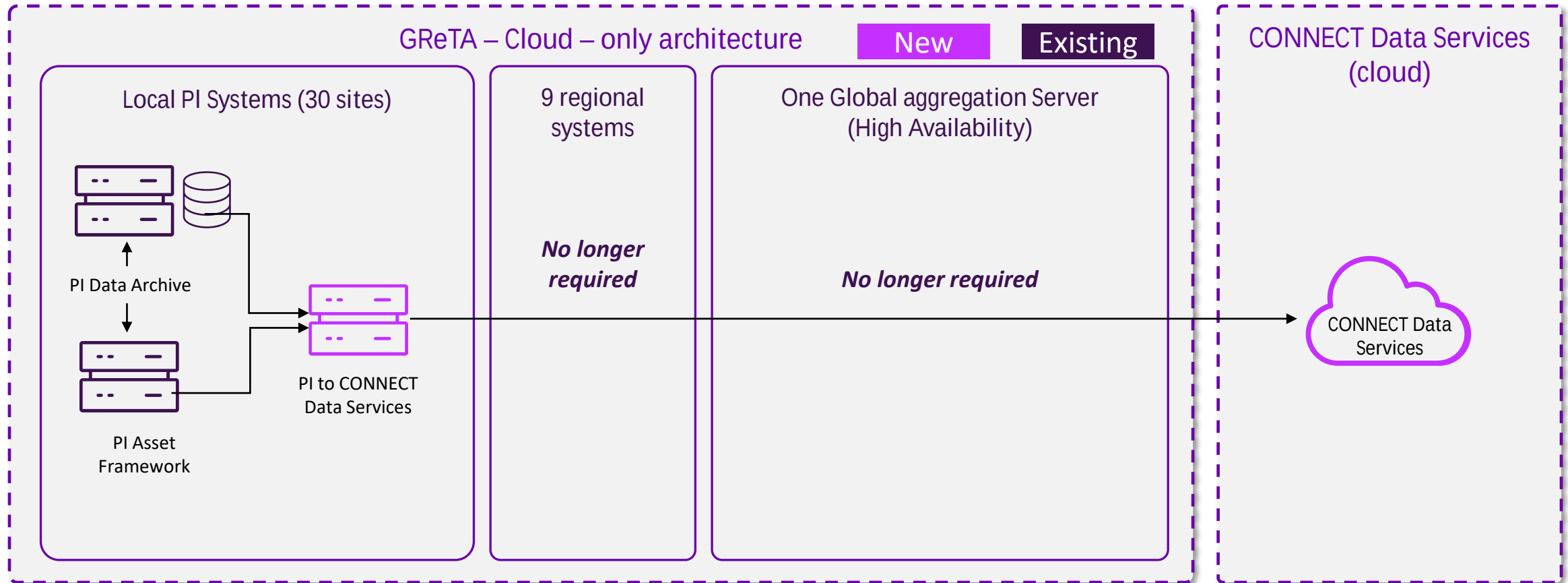
Solution to-be architecture (through central GReTA PI System)

Replacing potentially up to 70 associated Servers for a centralized Data Infrastructure



Solution to-be architecture

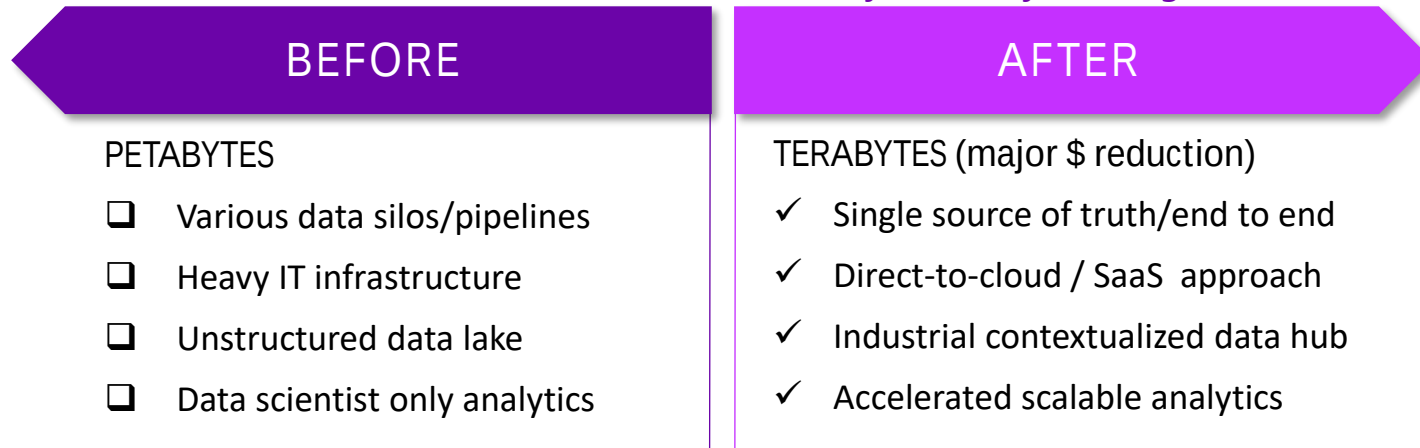
Cloud-only (Future consideration)



The CONNECT effect in practice

What have we achieved as partners in three months ?

Streamlined and accelerated the data-to-value for manufacturing



AVEVA CONNECT DATA SERVICES ENABLES ALL:



Low code **out-of-the box** analytics with AVEVA Advanced Analytics



Future **Dataiku** connectivity for Predictive Yield and other Machine Learning use cases



Connectivity to **Enterprise Data Lake Snowflake** and many more data consumers

“We didn’t expect to have tangible results within such a short time frame. CONNECT data services supported by a strong partner (Capgemini) accelerates the time-to-value of a cloud-based data infrastructure significantly.”

Heiko Trefzger, ROCHE, Product Manager – Data & Insights

Lessons learned

1

Data Engineering is fundamental at the very beginning:
Data selection, data quality, data governance, data contextualization



2

Think big, start small: Lighthouse Project
architecture as blueprint for ROCHE Industry
4.0 Roadmap



3

Regular cadence calls to ensure
collaboration efficiency



4

Life science as the key expertise of all
project stakeholders



5

Involve the product consumers
from business side internally at
ROCHE



6

Crossfunctional stakeholders from
manufacturing, IT, data science



7

Experience of Build vs. Buy



Next Steps

- PI Event Frames in CONNECT
 - PI to CONNECT Agent with Event Frames
 - Golden Batch Analysis with AVEVA Advanced Analytics (Perfect Batch App) using PI Event Frames
- Corporate Dashboards in CONNECT visualization

Acknowledgements

ROCHE

Bernd Sessler - Senior Automation Engineer, Global Engineering & Technologies, Global Business Process Owner Data Historian Solutions

Gerd Fromm - Product Owner Operational Data systems and applications

Heiko Trefzger - Product Manager – Data & Insights, Technical Operations Business Domain

Emmanuel Garuz - Data Analytics Specialist

Sumanth Artham - Data Analytics Specialist



Capgemini

Lukas Markwalder - Director, Capgemini Digital Manufacturing Switzerland

Gopal Gopalkrishnan - Senior Director, Portfolio – Global Digital Manufacturing CoE

Philippe Loup – Senior OT and Data Engineer



Octavesoft

Phillipp Sutter - PI System SMEs



Actemium

Pascal Nass - PI System SMEs



AVEVA

Hans-Otto Weinhold - Principal Solutions Architect

Reinhold Ehrle - Industrial Software Solution Sales Expert

Fabio Dani - Software Developer Engineer

David Hoven - Business Value Consultant

Erik Prins – Customer Success Manager

Brandon Ekberg - Data Analytics Expert



Questions?



Please wait for the microphone.
State your name and company.

Please remember to...

Navigate to this session in the
mobile app to complete the survey.

Thank you!



This presentation may include predictions, estimates, intentions, beliefs and other statements that are or may be construed as being forward-looking. While these forward-looking statements represent our current judgment on what the future holds, they are subject to risks and uncertainties that could result in actual outcomes differing materially from those projected in these statements. No statement contained herein constitutes a commitment by AVEVA to perform any particular action or to deliver any particular product or product features. Readers are cautioned not to place undue reliance on these forward-looking statements, which reflect our opinions only as of the date of this presentation.

The Company shall not be obliged to disclose any revision to these forward-looking statements to reflect events or circumstances occurring after the date on which they are made or to reflect the occurrence of future events.

 [linkedin.com/company/aveva](https://www.linkedin.com/company/aveva)

 [@avevagroup](https://twitter.com/avevagroup)

ABOUT AVEVA

AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

Learn more at www.aveva.com